

What is claimed is:

1           1. A catheter system comprising:

2                           a deflection region having a longitudinal axis and a length, the deflection  
3                           region having a wall, the wall having at least two sections, each section having a  
4                           specific density which is different from each other section, the wall sections  
5                           configured to define a predefined deflection pattern when a force is applied to the  
6                           deflection region.

1           2. The catheter system of claim 1, further comprising:

2                           at least one longitudinal element provided within the wall of the  
3                           deflection region, the longitudinal element being substantially axially aligned with the  
4                           longitudinal axis of the deflection region and providing a directional bias to the  
5                           deflection region.

1           3. The catheter system of claim 2, wherein the longitudinal element is  
2                           made from a shape memory material.

1           4. The catheter system of claim 2, wherein the longitudinal element is a  
2                           wire.

1           5. The catheter system of claim 2, wherein the longitudinal element is a flat  
2                           shim.

1           6. The catheter system of claim 1, further comprising an actuator member  
2                           provided to apply an actuation force to the deflection region.

1           7. The catheter system of claim 1, further comprising a rib along the wall.

1           8.     The catheter system of claim 7, wherein the longitudinal member is  
2     provided within the rib.

1           9.     The catheter system of claim 1, further comprising a body region having  
2     a body wall, the body region being attached to the deflection region.

1           10.    The catheter system of claim 9, wherein the body wall defines a lumen  
2     and a conduit is provided within the lumen.

1           11.    The catheter system of claim 10, wherein the conduit is located in the  
2     center of the lumen.

1           12.    The catheter system of claim 11, further comprising a torqueable  
2     member provided within the lumen.

1           13.    The catheter system of claim 12, wherein the torqueable member is  
2     located adjacent the conduit.

1           14.    The catheter system of claim 12, wherein the torqueable member is  
2     located adjacent the body wall.

1           15.    The catheter system of claim 10, further comprising a plurality of vanes  
2     adjacent the torqueable member.

1           16.    The catheter system of claim 1, further comprising a distal region.

1           17.    The catheter system of claim 16, wherein the distal region includes a  
2     treatment tip.

1           18. The catheter system of claim 1, further comprising a non-compressible  
2       element.

1           19. The catheter system of claim 9, further comprising a non-compressible  
2       element.

1           20. The catheter system of claim 18, wherein the non-compressible element  
2       is provided adjacent the wall.

1           21. The catheter system of claim 18, wherein the non-compressible element  
2       is provided within the wall.

1           22. The catheter system of claim 19, wherein the non-compressible element  
2       is provided adjacent the body wall.

1           23. The catheter system of claim 19, wherein the non-compressible element  
2       is provided within the body wall.

1           24. The catheter system of claim 19, wherein the non-compressible element  
2       is provided adjacent the wall and the body wall.

1           25. The catheter system of claim 19, wherein the non-compressible element  
2       is provided within the wall and the body wall.

1           26. The catheter system of claim 18, wherein the non-compressible element  
2       is a braided sleeve.

1           27. The catheter system of claim 18, wherein the non-compressible element  
2       is a coil.

1           28. A catheter system comprising:

2           a deflection region having a longitudinal axis and a length, the deflection  
3           region having a wall, the wall having at least two sections, each section having a  
4           specific density which is different from each other section,

5           at least one longitudinal element disposed within the wall of the  
6           deflection region, the longitudinal element being substantially axially aligned with the  
7           longitudinal axis of the deflection region and providing a directional bias to the  
8           deflection region, the different wall sections and the longitudinal element being  
9           configured to define a predefined deflection pattern when a force is applied to the  
10          deflection region.

1           29. A catheter system comprising:

2           at least two longitudinal elements disposed within a wall of a deflection  
3           region, the wall having a longitudinal axis and the longitudinal elements being  
4           substantially axially aligned with the longitudinal axis of the deflection region;

5           at least two actuator members, the actuator members being configured to  
6           apply respective actuation forces to the deflection region, the deflection forces being  
7           substantially aligned with the longitudinal axis of the deflection region;

8           wherein the longitudinal members and the actuation members are  
9           arranged radially around the wall of the deflection region relative to one another in a  
10          configuration to define a deflection plane and shape of the deflection region.

1           30. The catheter system of claim 29, wherein the longitudinal members and

2           the actuation members are aligned at ninety degree increments around the wall of the  
3           deflection region.

1           31. A catheter system comprising:  
2            a body region having a body wall, the body region defining a lumen;  
3            a conduit disposed within the lumen; and  
4            a torqueable member provided within the lumen, the torqueable member  
5    being configured to transmit rotational forces along the catheter system.

1           32. The catheter system of claim 31, wherein the torqueable member is  
2    provided adjacent the conduit.

1           33. The catheter system of claim 31, wherein the lumen has an outer  
2    periphery and the torqueable member is provided adjacent the periphery of the lumen.

1           34. The catheter system of claim 31, further comprising a plurality of vanes  
2    adjacent the torqueable member and the conduit, the vanes being configured to support  
3    the conduit within the catheter system.

1           35. The catheter system of claim 31, wherein the torqueable member is a  
2    braided sleeve.

1           36. The catheter system of claim 31, wherein the torqueable member is a  
2    coil.

1           37. The catheter system of claim 31, further comprising a non-compressible  
2    element

1           38. The catheter system of claim 37, wherein the non-compressible element  
2    is provided adjacent the wall.

1           39. The catheter system of claim 37, wherein the non-compressible element  
2       is provided within the wall.

1           40. The catheter system of claim 37, wherein the non-compressible element  
2       is a braided sleeve.

1           41. The catheter system of claim 37, wherein the non-compressible element  
2       is a coil.

1           42. The catheter system of claim 31, further comprising a distal region  
2       attached to the deflection region, the distal region including a treatment tip and being  
3       configured to affect a tissue to be treated.

1           43. A method of forming a catheter system, comprising the steps of:  
2       providing at least one longitudinal member;  
3       forming a body with a predefined density around the longitudinal  
4       element.

1           44. A catheter system comprising:

2           a deflection region having a longitudinal axis and a length, the deflection  
3           region having a wall, the wall having at least two sections, each section having a  
4           specific density which is different from each other section, the different wall sections  
5           being configured to define a predefined deflection pattern when a force is applied to  
6           the deflection region;

7           at least one longitudinal element disposed within the wall of the  
8           deflection region, the longitudinal element being substantially axially aligned with the  
9           longitudinal axis of the deflection region and providing a directional bias to the  
10           deflection region;

11           an actuator member, the actuator member being configured to apply the  
12           force;

13           a body region having a body wall, the body region being attached to the  
14           deflection region and the body wall defining a lumen having a conduit disposed  
15           therein;

16           a torqueable member provided within the lumen, the torqueable member  
17           being located adjacent the conduit and configured to transmit rotational forces along  
18           the catheter system;

19           a plurality of vanes adjacent the torqueable member, the vanes being  
20           configured to support the conduit within the catheter system;

21           a distal region attached to the deflection region, the distal region  
22           including a treatment tip and being configured to affect a tissue to be treated.